130575

OPERATING MANUAL

For

H-VW-M CYANIDE WASTE TREATMENT UNIT

MILFORD RIVET & MACHINE COMPANY

HATBORO, PA.

JANUARY 17, 1973.

GENERAL DESCRIPTION

Purpose

The H-VW-M Cyanide Waste Treatment Unit is designed to receive a steady stream of cyanide containing waste water from a collection sump and treat the waste water by the alkaline chlorination process.

The alkaline chlorination process for cyanides uses sodium hypochlorite solution to oxidize cyanide to cyanate at a pH of 10.5 and then oxidize the cyanate to carbon dioxide and nitrogen in the secondary stage at a lower pH of 8 to 8.5.

Removal of associated metals is accomplished by adjusting the pH in the neutralization stage to 8.5 - 9.0 to precipitate the metallic hydroxides. M&T settling aid is added to agglomerate the precipitate formed.

Process

The cyanide waste water from the Plating Room flows to the collection sump(wet well) and then is pumped to the H-VW-M Cyanide Treatment Unit. The sump pump is controlled by a liquid level control device which pumps the cyanide bearing wastes to the unit at high liquid level and shuts off the pump at low liquid level. The sump is also equipped with a high level alarm probe so that an alarm will sound whenever the level is above the pump down high level probe.

The sodium hypochlorite feeder pump is interlocked with the Vanton waste feed pump so that a solution of sodium hypochlorite is pumped to the reaction stage whenever waste is pumped to the unit. (The sodium hypochlorite feeder pump is a BIF Model 1200 rated for 0-24 GPH). A pH indicator-controller with the probe mounted in the H-VW-M Cyanide Treatment Unit will automatically add caustic as needed to maintain the pH at 10.5.

A BIF Model 1200 Feeder Pump rated to pump 0-24 GPH of liquid caustic is mounted on the unit. The pH Indicator Controller mounted on the unit is an Analytical Model 1C.

The partially treated cyanide waste water flows to the #1 Cyanide Reaction Sump. (This 5000 gal. capacity sump is equipped with a mixer). The pH is controlled by an analytical pH Indicator Controller with probe mounted in the sump. The Indicator Controller operates a BIF Model 1200 chemical feed pump which pumps sulfuric acid as needed to maintain the pH at 8.5.

From #1 Cyanide Reaction Sump the wastes flow to #2 Cyanide Reaction Sump (5000 gal. capacity); from #2 Cyanide Retention Sump the waste flow to the #3 pH Adjustment Sump (5000 gal. capacity). A pH Indicator Controller with the probe mounted in the sump adds sulfuric acid or liquid caustic as needed to maintain the pH between

Process (Cont'd)

Note: Overflow from the Nickel Rinse tank, including waste water from the Zinc and Cadmium plating tank cooling coils flows to the end outside sump tanks, and is pumped by an existing Chicago Pump Co. dry well pump under the control of a Warrick floatless level control direct to the #3 pH Adjustment Sump.

From the #3 Sump the waste water flows to the #4 Settling Sump tank (4000 gal. capacity), and then to the Final Settling Tank. A Beckman pH Recorder with the probe mounted near the discharge from the Final Settling Tank continously records the pH of the effluent water flowing to the sanitary sewer. Flow is estimated to average 10 GPM.

Sludge is drawn off periodically from #2 and #4 Sump tanks to the Sludge Chamber, from where it is pumped with the existing Chicago Pump Co. dry well sludge pump to a Sludge Holding Tank. In addition, sludge is pumped from the Final Settling Tank either to the Sludge Chamber or direct to the Sludge Holding Tank.

The Sludge Holding Tank is equipped with a Lightnin' Mixer. A Moyno sludge pump interlocked with a Lavin centrifuge is manually started, and is stopped by a Warrick low level control in the tank when the tank is empty.

The centrifuge is set up to operate automatically on a timed cycle so that sludge is ejected from the unit once per hour(or as needed). The Moyno sludge feed pump is stopped when sludge is ejected and started again on the feed cycle. The ejected sludge is collected in a drum, while the centrate from the centrifuge is discharged into the settling sump for recycling.

EQUIPMENT

Equipment - Integral Part of the Treatment

Item

1. One (1) - Chemical Feeder for liquid caustic - BIF Model 1211 Range 0-24 GPH delivery with Reagent head suitable for caustic feed. 1/3 HP, 200V, 3 Phase, 60 Cycle TEFC Motor.

   One (1) - Chemical Feeder for sodium hypochlorite feed BIF Model 1200.

   BIF, a Unit of General Signal Corporation
   Providence, Rhode Island.

2. One (1) - Analytical pH Indicator Controller Model 1C

   Analytical Measurements
   31 Willow Street,
   Chatham, New Jersey.

3. One (1) - Mixer - Lightnin Model ND-1A, 1/4 HP, 1750 RPM TEFC, 208V, 3 Phase, 60 Cycle with 48" long steer shaft, 9.4" dia. Steel Propeller and steel mounting bracket.

   Mixing Equipment Company
   Rochester, New York.

Equipment Supplied Separately for Field Installation

4. One (1) - Vanton Sump Pump

   Supplier: Vanton Pump & Equipment Corporation
   201 Sweetland Avenue,
   Hillside, N.J. 07205

5. Two (2) Sets Warrick Liquid Level Controls - One (1) set of controls for Wet Well and one (1) set for sludge tank.

   Supplier: Charles F. Warrick
   1624 West Eleven Mile Road
   Berkerly, Michigan.

6. One (1) - Chemical Feeder Pump for Liquid Caustic Feed BIF Model 1200

7. Two (2) - Chemical Feeder Pumps for sulfuric acid feed - and BIF Model 1211

Equipment Supplied Separately for Field Installation (Cont'd)

9. One (1) - Analytical pH Indicator Controller Model 1C

   Supplier: Analytical Measurements Inc.,
   Chatham, N.J.

10. One (1) - Beckman 940 pH Analyzer
    One (1) - Beckman Strip Chart Recorder
    One (1) - Beckman PVDC Submersible pH Assembly with Lazaran Electrode

    Supplier: Beckman Instruments, Inc.
    U.S. #22 at Summit Road
    Mountainside, N.J. 07091

11. Three (3) Balsbaugh Rinse Tank Controller System

    Supplier: Noonan and Brown Associates
    P.O. Box 404
    Stirling, N.J. 07980

12. Moyno Sludge Pump Model 1L3

    Supplier: Robbins and Meyers
    227 Grand Avenue,
    Palisades Park, N.J.

13. Moyno Sludge Pump Model 1L4 - mounted on casters.

    Supplier: Same as Item 12.

14. One (1) - Lightnin Mixer Model NDL for Sludge Tank

    Supplier: Mixing Equipment Company
    Rochester, New York

15. One (1) - Lavin Centrifuge complete with automatic scoop arrangement.

    Supplier: Lavin Machine Works
    Hatboro, Pa.

Page 3 Item 1. Chemical feeder for sodium hypochlorite feed should be indicated as "remote mounted".

Item 4. Vanton Sump Pump is Model SG-PT200B.

Page 4 Item 9. Change One (1) Analytical pH Indicator Controller Model 1C to Two (2) thus.

Add One (1) Analytical pH Indicator Controller Model 1C4-72.

Item 10. Change Beckman Strip Chart Recorder to Hays Republic.
Note local Hays representative is Systems Control
10 S. Orange St.
Media, Pa. 19063
(215) 565-2077

SEQUENCE OF OPERATION OF WASTE TREATMENT UNIT

Start-Up

1. Main circuit breaker at right edge of panel turned up to "ON" position.

2. Master "START" "ON" button depressed. This starts the agitator.

3. After approx. 60 seconds the pH meter, waste feed pump, the sodium hypochlorite and the caustic feeder pump are activated.

Controls

1. The time delay of 60 seconds is to allow the solution to mix prior to feeding. The sodium hypochlorite feeder pump and the waste feed pump can start if the liquid level high level probe is submerged in water. The sodium hypochlorite feeder pump only operates when the waste feed pump is on.

2. The caustic feed pump supplies caustic solution whenever the pH is less than 10.5 as controlled by setting the pH controller.

The pH Indicator Controller and acid feeder pump controlling the #1 sump can be activated by activating the electrical starter. These will automatically control the pH in this sump.

The pH Indicator Controller in #3 Sump controls an acid feeder and caustic feeder. The starter switch should be activated so that the meter and pumps can function properly. This will ensure pH control of #3 Sump.

A Beckman Recorder Controller installed in the final settling pit will record the pH of this pit and ring an alarm at low and at high pH readings. The electrical switch supplying power to this unit must be in the "ON" position.

OPERATION OF THE UNIT

The following is the recommended normal operating procedure:

Daily

1. Make sure that all chemical supplies are adequate.
2. Check to make sure that all feeder pumps are working.
3. Make sure pH meters are working.
4. Check to see that the Vanton Waste Feed Pump is pumping waste to the unit.

Weekly - pH Probe Service

(a) Check KCl level in reservoir. Refill with saturated solution of KCl. Keep level of KCl above the level of submersion.

(b) Clean pH probes and adjust pH meter by placing probes in buffer solution. Use buffer at two (2) different ranges low and high pH range. This will insure that the meter is calibrated correctly over the entire range.

Note: pH probes are fragile and must be handled with care. Probes should be cleaned with water and wiped with a soft tissue.

TESTING EFFLUENT WATER

The treated water discharged from the system should be checked periodically for cyanide content. A packaged Test Kit such as a Hach Kit can be purchased to give a quick accurate determination of the cyanide content.

SAFETY NOTES

1. A gas mask with a chlorine connector should be available at location close to the operation. This is important as any rupture of transfer lines may require use of the gas mask.

2. A gas mask equipped with a connector suitable for cyanogen chloride and hydrogen cyanide should be located outside the waste treatment building. This is to provide protection for the operator if he has to enter the waste treatment building in the event that a toxic gas is formed in the cyanide treatment unit.

SLUDGE COLLECTION

Once a day open the bottom sludge valves in Pits #2 and #4 for approximately 2 minutes, allowing sludge-bearing water from the bottom of the pits to flow to the Sludge Chamber. Pump sludge-bearing water from the Sludge Chamber to the steel Sludge Holding Tank with the Chicago Pump Co. dry well sludge pump periodically to fill and start sludge cycle.

Once a day pump sludge-bearing water from the bottom of the Final Settling Chamber, both sides of the bottom wood baffle, using the portable Moyno pump. Pump discharge may go either to the concrete Sludge Chamber or direct to the steel Sludge Holding Tank.

When Sludge Holding Tank is full, add one cap full of M&T Settling Liquid and agitate for 15 seconds. Stop the agitator and start the centrifuge.